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EXAMINER

WEINER, L

ART UNIT

PAPER NUMBER

1745

DATE MAILED:

06/26/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trad marks

Office Action Summary

Application No.
09/162,992

Applicant(s)

Senoo et al.

Examiner

Laura Welner

Group Art Unit

1745



☒ Responsive to communication(s) filed on May 26, 2000

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) 2-11 is/are pending in the application.

Of the above, claim(s) none is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 2-11 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 5-26-2000 have been fully considered but they are not persuasive.

Applicant argues that Akashi or Nakane et al. teaches the production of graphitized carbonaceous material obtained by firing meso-carbon micro-beads and this is because the specification on pages 23-24 of the instant invention states that Comparative Example 2 employs powders of the graphitized carbonaceous material obtained on firing petroleum coke, which would give a charging/discharging efficiency that is lower. The rejections still stand for the following reason. Neither reference teaches using graphitized carbonaceous material obtained on firing petroleum coke but instead Akashi teaches on page 5, lines 12-16, that suitable negative electrode materials may include a carbonaceous material such as pyrolytic carbon, graphite, glass-like carbon, a burned product of an organic polymeric compound, carbon fibers, active carbon, etc. Nakane et al. teaches in column 6, lines 11-27, an anode of the lithium secondary battery includes carbonaceous materials such as natural graphite, artificial graphite, pyrolytic carbons, carbon black, etc. and teaches that the carbonaceous material including a graphite material such as natural graphite and artificial graphite as a main component is preferred because the combination of such a carbonaceous material and a cathode provides a high energy density due to the flatness of their charging/discharging potential and low average working potential.

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In addition, with respect to the product by process of the negative electrode, the determination of patentability is based upon the product itself not upon the method of its production. *In re Thrope* 227 USPQ 964; *In re Brown* 173 USPQ 685; *In re Bridgeford* 149 USPQ 55; *In re Wertheim* 191 USPQ 90. Any difference imparted by the product by process limitations would have been obvious to one having ordinary skill in the art at the time the invention was made because where the Examiner has found a substantially similar product as in the applied prior art, the burden of proof is shifted to the Applicants to establish that their product is patentably distinct. *In re Brown* 173 USPQ 685 and *In re Fessmann* 180 USPQ 324.

Applicant argues that Ozaki et al. teaches that propylene carbonate is not employed for the non-aqueous electrolyte solvent but this reference was not used to teach using propylene carbonate but instead to teach that fabrication of the negative electrode plate which by using the mesophase graphite particles obtained by the processes described which was carbonized at 1000 degrees C and further graphitized at 2800 degrees C was mixed with styrene butadiene rubber is known.

The rejection of claims 2-4, 7 under 35 U.S.C. 103(a) as being unpatentable over Nakane et al. (EP 0 845 824 A1) in view of Ozaki et al. (5,522,127) and further in view of Chua et al. (5,240,790) or Abraham et al. (5,219,679) remains because there were no arguments made.

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Claim Rejections - 35 USC § 112

2. Claims 11, 2-10 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The gel electrolyte comprising the propylene carbonate solvent” is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

Claim Objections

3. Claims 11, 2-10 are objected to because of the following informalities: “meso-carbone-micro-beads” should be “meso-carbon micro-beads”. Appropriate correction is required.

Claim Rejections - 35 USC § 102

Claim Rejections - 35 USC § 103

4. Claims 11, 2-5, 7-9 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious Akashi (EP 0 724 305 A1).

Akashi teaches on page 3, lines 23-37, a gel electrolyte which has a polymer having a side chain to which at least one nitrile group is bonded and a cell produced by using such a fire-retardant gel electrolyte. Akashi teaches on page 5, lines 29-35, a fire-retardant gel electrolyte was prepared using polyacrylonitrile, ethylene carbonate and propylene carbonate weighed respectively in such amounts represented by Tables 1 and 2 and then added a LiPF₆ solution having a molar concentration of 1.0M. Akashi teaches on page 5, lines 12-16, that suitable

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negative electrode materials may include a carbonaceous material such as graphite, etc. Akashi teaches on page 5, lines 8-11, that the positive electrode may include a lithium/transition metal composite oxide.

With respect to the product by process of the negative electrode, the determination of patentability is based upon the product itself not upon the method of its production. *In re Thrope* 227 USPQ 964; *In re Brown* 173 USPQ 685; *In re Bridgeford* 149 USPQ 55; *In re Wertheim* 191 USPQ 90. Any difference imparted by the product by process limitations would have been obvious to one having ordinary skill in the art at the time the invention was made because where the Examiner has found a substantially similar product as in the applied prior art, the burden of proof is shifted to the Applicants to establish that their product is patentably distinct. *In re Brown* 173 USPQ 685 and *In re Fessmann* 180 USPQ 324.

5. Claims 11, 8-9 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nakane et al. (EP 0 845 824 A1).

Nakane et al. teaches in column 6, lines 11-27, an anode of the lithium secondary battery includes carbonaceous materials such as natural graphite, artificial graphite, cokes, carbon black, etc. Nakane et al. teaches in column 5, lines 28-34, that the cathode includes an active material. Nakane et al. teaches in column 8, lines 19-21, that also usable is a so-called gel-type electrolyte in which a nonaqueous liquid electrolyte is maintained by a polymer.

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With respect to the product by process of the negative electrode, the determination of patentability is based upon the product itself not upon the method of its production. *In re Thrope* 227 USPQ 964; *In re Brown* 173 USPQ 685; *In re Bridgeford* 149 USPQ 55; *In re Wertheim* 191 USPQ 90. Any difference imparted by the product by process limitations would have been obvious to one having ordinary skill in the art at the time the invention was made because where the Examiner has found a substantially similar product as in the applied prior art, the burden of proof is shifted to the Applicants to establish that their product is patentably distinct. *In re Brown* 173 USPQ 685 and *In re Fessmann* 180 USPQ 324.

6. Claims 11, 2-5, 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akashi (EP 0 724 305 A1) in view of Ozaki et al. (5,522,127).

Akashi teaches the claimed invention except does not specifically teach that the negative electrode material is obtained by firing meso-carbon micro beads and does not specifically teach that the specific surface area of the carbonaceous material is 0.1 to 10 m²/g.

Ozaki et al. teaches in column 3, lines 26-67 and line 4, lines 5-14, that fabrication of the negative electrode plate which by using the mesophase graphite particles obtained by the processes described which was carbonized at 1000 degrees C and further graphitized at 2800 degrees C was mixed with styrene butadiene rubber. Ozaki et al. teaches that the specific surface area ranges from 3.2 m²/g to 3.4 m²/g. Ozaki et al. teaches in column 3, lines 8-14, that the

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negative electrode formed by carbonizing, and graphitizing leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

In the event any differences can be shown for the product of the product by process, as opposed to the product taught by Akashi, such differences would have been obvious to one of ordinary skill in the art as a routine modification of the product in the absence of a showing of unexpected results. Furthermore, it would have been obvious to one of ordinary skill in the art to make the graphitized carbonaceous material by the process taught by Ozaki et al. and obtain the claimed specific surface area of the carbonaceous material because Ozaki et al. teaches that this leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

7. Claims 11, 5-6, 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakane et al. (EP 0 845 824 A1) in view of Ozaki et al. (5,522,127).

Nakane et al. teaches in column 6, lines 11-27, an anode of the lithium secondary battery includes carbonaceous materials such as natural graphite, artificial graphite, cokes, carbon black, etc. Nakane et al. teaches in column 5, lines 28-34, that the cathode includes lithiated nickel dioxide containing aluminum. Nakane et al. teaches in column 8, lines 19-21, that also usable is a so-called gel-type electrolyte in which a nonaqueous liquid electrolyte is maintained by a polymer. Nakane et al. teaches in column 7, lines 30-59, that organic solvents usable include carbonates such as propylene carbonate, ethylene carbonate, dimethyl carbonate, ethyl methyl carbonate, etc.;

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esters such as gamma-butyrolactone, etc. Normally, two or more compounds of the above are used in combination. Above all, a mixed solvent containing a carbonate is preferred and more preferred is a mixed solvent of a cyclic carbonate and a non-cyclic carbonate. Nakane et al. teaches in column 7, lines 20-29, that it is preferred to use at least one of the salts containing fluorine or at least one salt selected from a group consisting of LiPF_6 , LiBF_4 , LiCF_3SO_3 , etc. Nakane et al. teaches in column 9, lines 25-27, that the mixed solution LiPF_6 was dissolved in a concentration of 1 mol/l of the mixed solvent.

Nakane et al. teaches the claimed invention except does not specifically teach that the negative electrode material is obtained by firing meso-carbon micro beads, does not teach that the specific surface area of the carbonaceous material is 0.1 to 10 m^2/g and does not teach that the propylene carbonate has a proportion of 10-75 mol%.

Ozaki et al. teaches in column 3, lines 26-67 and line 4, lines 5-14, that fabrication of the negative electrode plate which by using the mesophase graphite particles obtained by the processes described which was carbonized at 1000 degrees C and further graphitized at 2800 degrees C was mixed with styrene butadiene rubber. Ozaki et al. teaches that the specific surface area ranges from 3.2 m^2/g to 3.4 m^2/g . Ozaki et al. teaches in column 3, lines 8-14, that the negative electrode formed by carbonizing, and graphitizing leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

In the event any differences can be shown for the product of the product by process, as opposed to the product taught by Nakane et al., such differences would have been obvious to one

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of ordinary skill in the art as a routine modification of the product in the absence of a showing of unexpected results. Furthermore, it would have been obvious to one of ordinary skill in the art to make the graphitized carbonaceous material by the process taught by Ozaki et al. and obtain the claimed specific surface area of the carbonaceous material because Ozaki et al. teaches that this leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use between 10-75 mol% of propylene carbonate, since it has been held that where general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

8. Claims 2-4, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakane et al. (EP 0 845 824 A1) in view of Ozaki et al. (5,522,127) and further in view of Chua et al. (5,240,790) or Abraham et al. (5,219,679).

Nakane et al. teaches the claimed invention as taught above teaching having a gelled electrolyte but does not teach that the gel electrolyte includes a high-molecular material having a nitrile group in its side chain in which the material is polyacrylonitrile.

Chua et al. teaches a secondary electrochemical cell which includes a solid gelled electrolyte system including an amount of polyacrylonitrile, an amount of solvent and plasticizer that includes gamma-butyrolactone. Chua et al. teaches in column 1, lines 10-16 and column 2,

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lines 10-55, that utilizing a solid gelled film polymeric electrolyte including polyacrylonitrile in combination with one or more solvent plasticizers together with one or more lithium salts offers operational safety, in addition to high energy density and excellent packaging flexibility. The present invention offers higher conductivity and improved layer interfacial stability. Chua et al. teaches that 12-22 mol% of polyacrylonitrile, 18-36 mol% of gamma-butyrolactone and 33-39 mol% of ethylene carbonate was used.

Abraham et al. teaches in column 2, lines 1-20, that polymer electrolytes having conductivities greater than 10^{-3} /ohm - cm can be formed between a low lattice energy Li salt such as LiBF₄, etc and a high dielectric constant aprotic organic solvent mixture of propylene carbonate and ethylene carbonate in a polymer matrix such as polyacrylonitrile.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the gelled film polymeric electrolyte taught by Chua et al. because Chua et al. teaches that a solid gelled film polymeric electrolyte including polyacrylonitrile in combination with one or more solvent plasticizers together with one or more lithium salts offers higher conductivity and improved layer interfacial stability and because one of ordinary skill in the art knows that the difference between being considered just a solid polymer electrolyte versus a gelled polymer electrolyte is the polymer used.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the electrolyte taught by Abraham et al. because Abraham et al. teaches that polymer electrolytes having conductivities greater than 10^{-3} /ohm - cm can be formed between a

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low lattice energy Li salt such as LiBF₄, etc and a high dielectric constant aprotic organic solvent mixture of propylene carbonate and ethylene carbonate in a polymer matrix such as polyacrylonitrile and because one of ordinary skill in the art knows that the difference between being considered just a solid polymer electrolyte versus a gelled polymer electrolyte in the polymer used.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ozaki et al. (EP 0 474 183 A2) teaches a secondary battery with a non-aqueous electrolyte having a high voltage and capacity and an improved cycle property, characterized in that an anode is comprised of graphite spherical particles such as spherical cokes and meso carbon micro bead. Ozaki et al. teaches that equivalent volume mixed solvent of propylene carbonate, ethylene carbonate was used as the electrolyte.

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

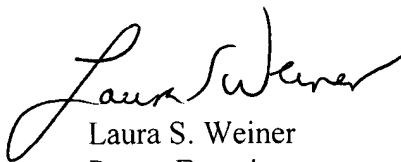
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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura Weiner whose telephone number is (703) 308-4396. The examiner can normally be reached on Monday-Friday from 7:30 a.m. to 4:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Maria Nuzzolillo, can be reached on (703) 305-3776. The official fax phone number for the organization where this application or proceeding is assigned is (703) 305-3599.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Laura S. Weiner
Patent Examiner
Art Unit 1745
June 26, 2000